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ABSTRACT

Universities that have been successful in providing computing-intensive environments for their user communities have done so by setting up campuswide task forces on computing strategies. In this report, the principal investigator recommends that a task force on constructing humane computing environments at the Ontario Institute for Studies in Education (OISE) (Canada) be established. A framework of issues and themes to be debated and discussed in such a study is suggested for the potential use of prospective task force members. Critical questions that must be entertained and resolved in carrying out an assessment of institutional philosophy, and of the planning process for meeting the computing needs of an increasingly growing body of users, are listed. A synopsis of an important book, "Campus Computing Strategies," that outlines computer policy formulation activities at leading American universities is also provided. Finally, the current status of OISE computing hardware facilities (terminals and cable connections) is tabulated. (Author/TE)

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CONSTRUCTING HUMANE COMPUTING ENVIRONMENTS IN EDUCATIONAL INSTITUTIONS

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Final Report:
Small Scale Project - 1983/84
Project #1519 - "Toward Institutional Computerization: Evaluating DEC's ALL-IN-1 Administrative Package"

April 30, 1984

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ABSTRACT

Universities that have been successful in providing computing-intensive environments for their user communities have done so by setting-up campus-wide Task Forces on Computing Strategies. In addition, responsibility for campus computing has often been elevated organizationally to the status of at least an Assistant Vice-President. It is also common for computing-intensive universities to create Standing Committees on Computing and Communications.

In this Report, the principal investigator makes the recommendation that a Task Force on Constructing Humane Computing Environments at OISE be established. A framework of issues and themes to be debated and discussed in such a study is suggested for the potential use of prospective Task Force members. Critical questions that must be entertained and resolved in carrying out an assessment of institutional philosophy and planning process for meeting the computing needs of an increasingly growing body of users are listed. A synopsis of an important book, Campus Computing Strategies, that outlines computer policy formulation activities at leading American universities is also provided. Finally, the current status of OISE computing hardware facilities (terminals and cable connections) is tabulated.

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Finally, I would like to acknowledge the assistance provided by the Computing Services Group (CSG) for making data describing the computing hardware profile at OISE available to the research team.

CONSTRUCTING HUMANE COMPUTING ENVIRONMENTS IN EDUCATIONAL INSTITUTIONS

George S. Tracz*

INTRODUCTION

Universities are entering periods of great stress and turbulence. Persistent underfunding, obsolescent plant and out-of-date equipment are creating significant pressures on administrative operations and substantial decline in faculty and student morale. On the other hand, managers in work environments surrounding institutions of higher learning are demanding that graduates be well-versed in "computing know-how" or some form of computer literacy (whatever that term means now). In addition, the news media keep on bombarding the public with hyped-up announcements and seductive descriptions of the latest computer and communications hardware technologies available to the prospective buyer. In view of this set of emerging scenarios, what strategies can an educational institution formulate in order to construct computing environments that will effectively support labour-intensive teaching and research activities in a humane fashion?

BACKGROUND

The original purpose of this small scale project (entitled "Toward Institutional Computerization: Evaluating DEC's ALL-IN-1 Administrative Package") was to have been the evaluation of a computer software package designed to assist administrative users in increasing their efficiency in day-to-day activities. The principal investigator

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had been promised the use of this package for a period of five months on a complimentary trial basis. The intent was to introduce the ALL-IN-1 system on a pilot basis, evaluate its effectiveness, and then recommend (or not) its purchase. Unfortunately, a new policy of the Digital Equipment Corporation imposed a substantial rental fee for trial uses of software; the fee set was about twice the total cost of the small scale project and it became necessary to redefine the parameters of research activities that could be realistically undertaken. (Luckily, the new DEC policy turned out to be a blessing in disguise.)

RECONSIDERATION

The change in DEC policy for software package trial loans made it necessary for the principal investigator to place the project in a proper perspective. Successful introduction of a new computer innovation requires the particular group of users to be "ready" for its acceptance and full-fledged utilization. Readiness may include a large number of factors such as knowledge and understanding of the innovation, hardware availability, a reasonable level of computing background, support for the venture, and so on. Presently, the necessary level of institutional user involvement is not diffused enough to allow the innovation reflected by the ALL-IN-1 package to "take hold."

I think it is critical to have the Institute develop an organizational awareness of the desirable computing environments it wants to construct for the near future. As a result, a framework was designed to create a process that would orient Institute users to a more effective and humane assimilation of information processing technologies for instructional, academic and administrative activities.

RECOMMENDATION

The major recommendation arising out of this small scale activity is that a Task Force on Constructing Humane Computing Environments at OISE be established. Rather than my suggesting the actual composition of this Task Force (a design question that can be effectively resolved by OISE's Senior Administration), I have focussed instead on preparing appropriate background material that can be of substantial assistance to the Task Force members.

The important issues that the Task Force members will have to address can be listed as follows:

- OISE computing environments
- current status of computing (resources, technologies, and utilization)
- current activities at other institutions
- identifying Institutional computing goals
- planned evolution
- implementation strategy
- future developments

SUPPORT MATERIAL FOR AN INSTITUTE-WIDE TASK FORCE

The background material provided by the principal investigator can be regarded as a "data base" to be used by members of the Task Force that will facilitate the articulations of issues and themes that they will address.

Section A represents a framework listing key elements were a comprehensive Report undertaken by a Task Force on "Constructing Humane Computing Environments in Educational Institutions" to be prepared. Obviously, the Task Force is (and should be)

free to design its own Terms of Reference; however, Section A does facilitate the construction and identification of the objectives of such a study.

Section B fine-tunes the above process by suggesting a number of key questions to be used as a "debate and discussion" platform among the Task Force members.

Section C provides an additional richness in the language of design for the Task Force by highlighting specific steps taken by nine universities in the United States in carrying out a similar assessment of their computing implementation plans.

I hope the compilation of this material will be of great assistance to many members of the OISE community. It will be of greater benefit if a "Task Force on Constructing Humane Computing Environments at OISE" is established without delay.

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SECTION A

SUGGESTED FRAMEWORK FOR REPORT BY TASK FORCE ON CONSTRUCTING HUMANE COMPUTING ENVIRONMENTS AT OISE

I INTRODUCTION

- Need for comprehensive study
- Objectives of the study
- Institutional computing
- Productivity of the educational professional and educational support staff
- philosophical stance
- humane considerations

II CURRENT STATUS OF COMPUTING IN THE INSTITUTE

(A) The OISE Computing Environment
- educational
    - micro lab
    - user lab (1506 etc.)/user area
    - statistical consulting lab
    - Educational Evaluation Centre
    - ICON demonstration and development centre
- research (social sciences)
    - Individualization project
    - Ontario Acceptable Educational Microcomputer room
    - research micro lab
    - Franco-Ontarian Centre (language arts)
- administration
    - institutional support systems
    - administrative support systems
    - departmental support systems
    - academic support systems
- organizational structure
    - policy and planning committee for computing
    - administrative committee for computing
    - reporting structure
    - user groups input
- systems support
    - Computing Systems Group (CSG)

(B) Computer resources and utilization: current status
- inventory
    - VAXes, terminals, printers, micros (hardware)
    - software
    - users - faculty, student, research, administrative, support staff
    - external - charges
        - cost structure (whose responsibility?)

(C) Current Activities at other Institutions
- Carnegie-Mellon University
- Stanford University
- Brown University
- Pepperdine University
- University of Waterloo
- others

III BASIC TECHNOLOGIES

- networking
- text-processing
- central computing
- instructional and student use
- research
- administration: administrative data processing
- academic computing
- library automation
- data base management

IV COMPUTING ENVIRONMENTS

- evolution of planning and management of information technology
- increased use of microcomputers - personal computers
  - micros
  - work stations
  - terminals
- large increase in user population
- integration
- support systems
- decentralization
- communication

V IDENTIFYING INSTITUTIONAL COMPUTING GOALS

- office automation
- word-processing and text-processing
- efficiency (time and mental resources)
- managing computing services
- computing literacy for the Institute
- electronic mail (ALL-IN-1)
- increased service
- Institute Network - technological configurations
- projected configurations
- mainframe networking
- microcomputer networking
- mainframe-micro networking
- transparency

VI PLANNED EVOLUTION

- vision: planning for the future
- planning process
- immediate tactical planning
- intermediate planning - tactical and strategic
- long-range strategic planning
    - factors inhibiting and favouring long-range strategic computation, communication, and information services

VII FUTURE DEVELOPMENTS

- upgradability
- user-interface
- topics for future study - training and education
    - humane use
    - data security
    - library planning
- future computing environments
- Institute Office of Information Technology

VIII RECOMMENDATIONS OF TASK FORCE: RESOLUTIONS OF THE FOLLOWING ISSUES

Common Themes

- academic needs
- faculty needs
- staff needs
- student needs
- word-processing
- telephone system
- video communication
- non-telephone communication
- standardization (cost reduction and resource sharing, software and hardware for transparency)
- vertical versus horizontal integration
- education: documentation and support (computer literacy)
- easy access public workstations (perhaps by department)
- hardware and software support
- costs (chargeback policy)
- resource strategies
- financing strategy
    - implementation strategy
    - and so on (above is only a partial list)

SECTION B

SUGGESTED QUESTIONS FOR STUDY BY TASK FORCE ON CONSTRUCTING HUMANE COMPUTING ENVIRONMENTS AT OISE

1. Given that institutional computing is evolving toward decentralized information processing, how do we construct computing environments that provide users with a convenient and comprehensive access to information technologies for instructional, research, and administrative activities in a humane fashion?

2. What strategies need to be adopted to identify the kind of computing environment that the Institute should develop?
   - for example, by establishing an Institute-wide Task Force on Educational Computing Futures?

3. Is there a need to create a Standing Institute Committee that assesses and monitors the impact of computerization on the Institute user community and its environment?
   - for example, are OISE faculty and student attitudes and values related to computing changing?

4. What are the perceived needs of the OISE computing community? What are the common themes among various groups of users in this community?

5. User group consensus planning structures. Does there exist a need for input and consensus from users when new technologies are being introduced in the Institute?
   - for example, is there presently a formal structure at OISE that facilitates the input of the users' views?

6. How do we provide a central communication resource for fast and accurate network links to facilitate a decentralized computing environment?

7. Through what mechanisms does the Institute manifest a corporate visibility to develop industry and government funding for large-scale co-operative computing ventures?

8. What concerns should be addressed to the possible proliferation of microcomputers?
   - for example, is there an organizational structure that is centrally responsible for ensuring compatibility in the departmental/unit purchase of hardware?
   - can we strive towards an intensive computing culture by adopting a "Terminals for Managers" Program in which all the OISE senior officers (including chairpersons) are equipped with a desk-top terminal capability?
   - How do we move on recommendations made elsewhere that all new incoming students be required to acquire a microcomputer, although OISE may play a role in providing a subsidy for this purchase?

SECTION C

Synopsis of Campus Computing Strategies, edited by John M. McCredie. Bedford, Massachusetts: Digital Equipment Corporation, 1983. 316 pp.
Prepared by Byron Hermann

Introduction

* Organize to take advantage of information processing applications
* Need strategies to face technological changes
* Computing systems are partners in the teaching and research process

Predominant Computing Environment Themes

1) Information based economy
2) Increased demands for Information Processing courses/instructional computing are growing, not just computer science
3) Computer applications' growth in new areas due to lower costs
4) Shortage of trained Information Processing personnel
5) Current personnel and facilities crisis in academic computing science departments
6) Spread of micros is decentralizing campus computer resources/ need for new networking and communications capabilities
7) link of library and computing centers
8) Nation-wide educational networks (EDUNET)
9) Administrative computing is difficult and costly
10) funding is at inadequate levels
11) new economic partnerships are needed
12) Need "effective models of integrated planning and priority setting"; new positions and high level Task Force for planning

Common Planning Needs

1) literacy or skill or foundation. What level is appropriate for our Institute?
2) money - salaries, investment capital
3) "Planning Process" due to dynamic nature of the activities and topics

Common strategies

1) organizational structures
2) decentralization
3) personal computers
4) networking
5) library automation
6) Information processing literacy
7) text-processing
8) electronic mail

Common Problems
1) expectations raised to unattainable levels
2) backlash by existing groups
3) fear of being "stuck" to one pattern only

HAMILTON COLLEGE

Goals
1) to encourage computer literacy among faculty members and students
2) develop an appreciation of computer resources
3) increase efficiency of administrative operations
-link to Cornell University
-EDUNET

Present Characteristics
1) Micro computer facility for 250 students
2) library automation
3) administrative usage new but growing

Future Trends
"Communication will be the link that makes possible distributed approaches to computing without sacrificing availability and accuracy of information. For Hamilton College, such associations and communications have already provided a direction for the 1980s."

DARTMOUTH COLLEGE

Philosophy

How to combine centralization and decentralization at a time of rapid change? What are the advantages and disadvantages of standardization?

A) Centralize (1962-1976 period)
B) Decentralize
1) real-time computing
2) number crunching
3) statistical analysis
4) computer science
C) Management - Long-term Planning
1980 - new department structure
- informal users groups consensus planning (good communication)
1981 - new Task Force on Computing to advise on the long-term directions
- academic computing
- services and opportunities in instruction and research
- administrative data processing - priorities and procedures
- library computing

- word-processing
- financial control
- organization and management structure
- interaction between different areas of computing

Future plans

Timesharing versus personal computers
High-speed networks
Ad hoc strategy committee on word-processing
Evolution is the route

PEPPERDINE UNIVERSITY

Philosophy

- computer literacy requirements for all
- network of microcomputers to word-processors will facilitate the administrative and educational decision-making processes of the institution
- system and planning division - computer science department
- organization structure
- increased service - a PLANNED evolution
- microcomputer based word-processing equipment
- word-processing Task Force
- metamorphosis of computer services (regulated and planned)
- computer services as a UTILITY (such as light or water)

CARNEGIE-MELLON UNIVERSITY

Philosophy

- More convenient and comprehensive access to information
- computer technology has the potential to improve qualitatively the university's effectiveness and output

Planning
- STRATEGIC PLANNING is directed at change
- categories:
  - situation audit
  - WOTS-up analysis
  - market niche location evaluation
  - service portfolio analysis
  - synergy
  - gap analysis
- demand for computing is growing more than 30% each year
- Task Force for the Future of Computing
- decentralized computing, via departmental computers

Recommendations
1) Networked Personal Computing
   - reduce contention for computing resources
   - simplicity / user-interface
   - need a structured and planned approach to take advantage of home personal computers

2) Computing environment
   - central computer facility
   - communications facility - total band-width
   - local clusters
   - personal computers
3) Implementation strategies
   - use timesharing systems to do the initial development and testing of some of the software
   - acquire personal computers for development and cluster use before they become cost-effective for wide distribution
   - provide function that is ultimately to be made available by the personal computer through the central facility or cluster until it can be provided in a personal computer
   - deploy a personal computing environment which does not meet all of the goals to a subset of the community on a trial basis
   - begin the deployment of personal computers with small pilot groups

RENSSELAER POLYTECHNIC INSTITUTE

Goals and Philosophy

- planning for future information technology at an academic institution should be integrated with other strategic planning activities
- virtually all 5000 students use the computer
- new systems should be complementary

Planning Guidelines
- top administrative commitment and participation are essential to obtain the co-operation of varied elements on campus
- the computing function is integral to the overall goals and objectives of the university, and a computing plan is essential for systematic improvement
- computing is expensive, and growth in usage is inevitable [Computing is an essential ingredient of the college educational process and there is no viable alternative to spending the money necessary for adequate facilities]
- the computing centre staff must be highly professional and able to relate to the needs of students , faculty, research and administrative users
- the computing needs of an academic institution are diverse, and it is unlikely that a single simple answer could meet all needs
- there are few absolutes in meeting computing needs at a university, and there are no permanent solutions
- computing requirements will continue to grow and to change

STANFORD UNIVERSITY

Philosophy

- information technology - the machines and systematic procedures which help create, collect, process, and disseminate signs and symbols
- group to study the impact of technology on education
- various spheres of interest

Planning
- networking
- data base management
- text handling
- central computing

User Needs
- instructional use - access to computers similar to access to library
- research use
- administrative use
- planning and management of information technology
  - the knowledge function
  - the value function
  - the action function
- campus wide network

CORNELL UNIVERSITY

Goals for Computing at Cornell
1) To provide ready access to modern computing facilities and services for all students, faculty, and staff research
2) To provide the facilities needed for the operation of modern efficient administrative support systems
3) To further the growth of computing awareness throughout the University
4) To progress towards the above goals in a fiscally sound manner

Current Status
- about 50% of Cornell's 12,000 undergraduate students have had significant contact with computers
- researchers in well-funded disciplines have managed to equip themselves with laboratory computers
- encouraged the acquisition of laboratory micro- and mini-computers
- a Decentralized Academic Computer Support Group was established

Planning Process
- Computer Services Plan
  - to improve student computer literacy
  - to maintain state-of-the-art facilities in support of research
  - to replace obsolete administrative systems

Planning Assumptions
- instructional support provided by clusters of microcomputers or terminals in instructional buildings, libraries, and dormitories
- text-processing support, graphical support, user-friendly computing
- research support requirements
- professional workstations
  - electronic mail
  - general access to national networks
  - interactive social science support
  - data archive support
  - support for large-scale computations
  - bibliographic search capabilities

CALIFORNIA STATE UNIVERSITY

Philosophy

- stay at forefront in the delivery of knowledge

A) The Planning Environment: Present and Projected
- 19 campuses, 300,000 students
- Instructional - information technology literacy for all
- Management - futuristic visions

B) Missions and Goals

- to plan, develop, implement, maintain, and manage technologies to assist:
  faculty and students in teaching/learning process
  administration in efficient management
  public service

C) Support of Instruction and Research

- operate in a knowledge-based environment

Current Status:
- all students and faculty have access to computing resources
- provide basic services

New Foci:
- develop and implement capabilities which provide students and faculty training and access to emerging technological resources
- faculty/staff training
- word/text-processing
- graphics, CAI, external data bases
- special centres

D) Support of Institutional Management

- goals - improve decision-making and productivity by
  i) developing a comprehensive, integrated management system

ii) putting into place technological resources and organizational changes
- information systems thrust
- Office Automation thrust

E) Public Service

- establish computer-based education distribution centres

F) Division of Information Services

- oversee campus activities
- specific campuses management decisions
- campus user departments

G) Campus and Network Technological Configuration

- statewide data communication system to link multi-campus mainframes to campus mainframes and minicomputers
- campus mainframes ringed by minis and micros
- totally integrated network with campus and system-wide links

UNIVERSITY OF MINNESOTA

Planning

- different levels of planning occurring simultaneously
  1) immediate tactical issues
  2) intermediate-range planning - library automation
  3) institutional strategy
     - computing, communications, and information technology (CCI)
     - type of CCI environment
     - funding goals
     - establish organizational structures
     - set in place major policies

Future Goals
- implement plans from other institutions
  - Terminals for Managers (Stanford University)
  - Carnegie-Mellon University goal of a workstation micro for every student and staff
- face impacts on
  - educational programs
  - operations
  - resources
  - attitudes and behaviours (personal and institutional)
  - organizational structures

Implementation Planning Strategies

1) Immediate Tactical Planning

- immediate plan to upgrade saturated computers (Cyber 74 and Cray 1B)

2) Intermediate Planning - Tactical and Strategic
   - telecommunications
   - broad-band cable communications system
   - library automation

3) Long-range Strategic Planning
   - provide a long-term sense of direction or general goal
   - a sense of fiscal constraints related to CCI services and priorities
   - an organizational structure to carry out CCI activities
   - major operating policies for CCI activities

   Pre-Questions
   - is the technological revolution here to stay?
   - less revenue?
   - tension between planning and action?
   - threatening aspect of information technology?
   - central nature of CCI to the university?
   - potential for increasing productivity?
   - appearance of good management?
   - need for strategic context for upgrading?

4) Initial Planning Mechanism
   - establish a committee of planning for planning
   - issue 3 reports a) Environment and Issues
     b) Alternative actions
     c) Recommendations

   Report a) i) summary of existing services
   ii) analysis of U.S. high technology use to improve productivity
   iii) strategic goals, resource strategy, organizational structures, internal policies to control tactical decisions

   Report b) Alternatives in each of 4 areas
   i) overall funding levels
      - intensive goal (10 million $)
      - competitive goal (6 million $)
      - reactive goal (2 million $)
   ii) sources of funding
      - institute
      - government
      - private sector
   iii) organizational functions
      - coordination
      - planning
      - policy administration
      - support and review
      - line management
      - combinations of above
   iv) review network implications of new system central review of departmental word-processing and administrative systems

Report c) Recommendations

- intensive goal (10 million $)
- incremental resources
- central policy planning by senior officers
  - micros, networking, word-processing, data bases, printing, graphics, duplication, system support
- new officer at associate Vice-President level
- establish interim group for planning a permanent organization

TABLE I

Computing Hardware Profile at OISE:
Terminal and Cable Connections

Department	room	terminal type	faculty	support staff	student	
CENTRAL ADMINISTRATION						
DIRECTOR	12-126	VT101	X			
FS&R	12-111	Xerox820		X		
		Xerox820				
		Xerox862				
		VT220	X			
	12-136	-----				
Grad. Studies	11-123	----		X		
	118	Cybernex	X			
ADMINISTRATIVE SERVICES						
CSG	16 lines	unused				
	8-275	DECW			X	
	8-291	pet	X			
	293	VT100		X		
	297	VT100		X		
	289	TTY		X		
	294	VT100	X			
	19 lines	students and users				
	284	---	X			
	275					stats lab
	3-329					advice desk
	360	VT100		X		
	298	VT100		X		
	228	hazel	X			
	299	VT100	X			
	292	VT100	X			
	3-360					micro-lab
	2 decwriters					
	2 diablos					
Media Ser	4-426	----				
Publications	9-120	TTY		X		
Library	3-360	IBM		X		
CENTRES						
Ed. Ev. Centre	11-191	VT101	X			
	192	VT101		X		
	183	VT101		X		

Mod. lang.	10-295	diablo		X		
Women's Centre	8-105	VT100		X		

Department	room	terminal type	faculty	support staff	student
Franco. Ont	6-208	Cybernex	X		
CACS	9-171	VT100	X		
ACADEMIC					
Adult Ed.	7-143	DECW		X	
	232	VT100		X	
	285	VT100		X	
App. Psych.	9-229	datamed	X		
	166	4-VT1100	X		
Curri.	10-138	DECW	X		
	151	VT100			
Ed. Admin.	7-234	DECW		X	
HEG	9-191	DECW	?		
H&P	8-128	hazel		X	
	136	VT101	X		
	151	VT100			
MECA	220	VT100	X		
	228	VT100		X	
	215	VT100 micro/			
	222	VT100			X
	285	TTY-43	X		
	229	LA100		X	
	226	VT100	X		
	280	VT100	X		
	284	VT100	X		
	223	VT100		X	
	228	----		X	
	224	----	X		
	281	VT100		X	
Soc.	6-184	datamed		X	
Sp. Ed.	6-299	VT100	X		
		VT100/LA100	X		
SPECIAL PROJECTS					
RSM (ICON)	12-210	VT100	X		
IPG	7 lines	unused			
	3-433	VT100		X	
	346	Volker	X		
	341	VT101	X		